

Notes on some of the British Nepticulidae (Lep.)

By Lieut.-Col. A. M. EMMET, M.B.E., T.D., M.A., F.R.E.S.

The notes which follow deal, as the title declares, with only *some* of our species of Nepticulidae: they do not attempt to cover the family exhaustively. Some common species are omitted because I have nothing constructive to say about them; others, which are more local, I have not yet encountered. The notes follow no set pattern. In some cases I have tried to widen our knowledge of biological history; in others, to record new localities; with others, to help entomologists to differentiate the mines. In short, I have included a miscellany of information, new or forgotten, which has come to my notice, in connection with the most neglected family of the British lepidoptera. I am filling the gaps, not writing a text-book.

The study of the Nepticulidae is in one respect a wider and richer pursuit than that of most other lepidoptera, for it involves a secondary science, that of minology. If you say "*Iris*" to me, I see a handsome butterfly in my mind's eye; but if you say "*Weaveri*", I see, not a moth, but a leaf of *Vaccinium vitis-idaea* containing a mine and a cocoon. So the notes which follow deal more with the mines than the moths. Yet both must be studied together. New species have been erected on the evidence of the mines alone and have proved to be chimaeras, for there are some members of the family which are variable in the formation of their mines. In other cases, a small difference in the mine does indeed indicate a different species. So, as I say, the mine and the moth are a partnership which must be considered together, if mistakes are to be avoided. It follows that both must be collected together, and a herbarium of pressed leaves in which there are mines is just as important as, and far more interesting than, a cabinet drawer of set specimens.

The late Professor Hering did a great deal to promote the study of minology. He emphasised the importance of sharing information if progress is to be made. He writes: "Once again it should be emphasised that as many entomologists as possible should get together, and where convenient work in groups; it then becomes possible to exchange experience, and show each other species of mines which have been identified, so that the experience of one becomes available to the others and in this way the unnecessary and frequently difficult breeding of known species can be avoided. Reciprocal exchange of information on breeding experiences of every kind will facilitate everyone's work and the amount of new information discovered will in this way be greatly extended. Assistance with each other's determination problems will eliminate the necessity for duplicating breeding of the same insect, and the pleasure attendant on every fresh discovery will in its turn help to increase interest in minology" (Hering, 1951, p. 330). So in writing these notes I am hoping that others will come

forward to supplement and correct what I have written, and will continue where I have left off.

Some people quite wrongly regard me as an expert in the Nepticulidae merely because I am one of the few people in this country who studies them; a fourth-former is a scholar among Hottentots. A question I am repeatedly asked is: "Are we to call them Stigmellidae or Nepticulidae, or, if some are one and some the other, what is the difference?" *Stigmella* was coined by Schranck in 1802 and *Nepticula* by Heyden in 1843; so *Stigmella* has priority. When Beirne (1945) made a revision based on the structure of the genitalia, he used the name Stigmellidae for the family as a whole, but retained *Nepticula* for one of the genera into which he divided it. Beirne's revision does not appear to have been entirely accepted on the continent, but it was used by Heslop (1964) except that he gave the family name as Nepticulidae. The forthcoming edition of Kloet & Hincks's check-list follows Heslop in this respect. That work, which has not been finalised at the time I am writing, classifies the British members of the super-family as follows:—

NEPTICULOIDEA

NEPTICULIDAE

(=STIGMELLIDAE)

- Stigmella* Schranck (about 36 species)
- Nepticula* Heyden (about 36 species)
- Dechtiria* Beirne (15 species)
- Fomoria* Beirne (2 species)
- Levarchama* Beirne (2 species)
- Fedalmia* Beirne (1 species)
- Etainia* Beirne (4 species)
- Trifurcula* Zeller (3 species)
- Bohemannia* Stainton (= *Scoliaula* Meyrick) (1 species)

OPOSTEGIDAE

- Opostega* Zeller (4 species)

TISCHERIIDAE

- Tischeria* Zeller (5 species)

Kloet & Hincks is to be our bible as far as nomenclature is concerned, and therefore, with that work, we should say Nepticulidae: but we must bear in mind that our continental friends do not talk quite the same language. I do not know why the junior name has been adopted: it may well be on the grounds of usage, since the abbreviation "nep" is a familiar part of the vocabulary of microlepidopterists, and the choice will be popular.

These notes deal with only the first seven of the genera given above, in other words with the species embraced by

Nepticula in Meyrick (1928) and Ford (1949).

A scientific classification based on anatomical affinities is one thing, but for the practical study of mining insects in the field a more convenient grouping is according to the foodplant. This arrangement (initiated, in the literature I have read, by Professor Waters (1924)) is followed by continental writers and I am happy to fall into line. It also makes it easy to leave certain foodplants (e.g., beech) for possible future treatment.

Readers may notice that I speak of cocoons and not pupae. The reason is that I do not know whether the insect inside the cocoon is overwintering as a larva or a pupa. If one wishes, one can have a look. Slight pressure with fine forceps on the sides of the broader end of the sweet-corn-shaped cocoon will cause it to open its mouth like a snapdragon, and one can peep inside. But your nep is a modest insect, and it would sooner die than stomach such an intrusion on its privacy.

I shall conclude this introduction by stressing once again that I am not an expert and have not been studying the Nepticulidae for long. Perhaps it would have been wiser for me to have kept my mouth shut for the time being, for I am bound to have made mistakes. But if I have done so and they are corrected by other writers, a useful purpose will have been served. The notes which follow reveal many gaps and uncertainties in our knowledge of this family, which offers one of the richest fields to the entomological explorer. Too many people are dissuaded from tackling the neps because they are afraid to handle such tiny insects, but it is in resolving the problems of entomology that its fascination lies. The physical difficulty of setting the Nepticulidae will be found to be far less formidable than the imagination painted it, while the intellectual difficulties involved in their study offer an exciting challenge.

ACER PSEUDOPLATANUS L. (Sycamore)

Mr S. Wakely (1962) recorded mines of two types in the leaves of sycamore at Mickleham, Surrey. He had submitted them to the late Mr Carolsfeld-Krausé of Denmark, who pronounced that those with the thicker excremental line of dispersed frass were made by *Nepticula speciosa* Frey, while those with the very narrow continuous line of frass were *N. pseudoplatanella* Skala, a species new to Britain. Wakely bred parasites, but no moths. Since then I have visited Mickleham on three or four occasions, always with Mr Wakely, and have found a good many mines of both types, both not uncommonly occurring in the same leaf. Our timing has been bad and few of our mines have been tenanted, but from those that were I have reared two specimens of *speciosa*. It has always seemed odd that two such local species should occur together and I have long suspected that both forms of mine were made by the same insect. These suspicions are confirmed by Borkowski (1969) who has bred from both types of mine and found no

difference in the imagines. *Pseudoplatanella* Skala becomes a synonym of *speciosa* Frey.

The species appears to be distinctly uncommon. Apart from Lyndhurst, Hants, where it was first discovered, Mickleham and Blackheath (Wakely, *loc. cit.*), the only locality I know is High Halstow in Kent, where Mr Wakely showed me a mine during a field meeting held in October 1968.

Meyrick (1928) and Ford (1948) make *speciosa* univoltine, with a larval season from August to October: Hering (1957) and Borkowski regard it as bivoltine with larvae in June as well as the autumn. It may, of course, have one generation in England and two on the continent, but the number of vacated mines I found on the 29th July 1970, when I also took an imago on a trunk, suggests that we have two generations too. On the day in question, I also found four tenanted mines (two of each type), whose larvae duly spun up; these could have been late examples of the first of early members of the second brood. No imagines have yet resulted, but their emergence next spring is still a possibility.

On the 9th July I also took a specimen of *Etainia decentella* H.-S., which was resting on the same trunk as the imago of *speciosa*. This species was introduced as new to Britain by Robert Adkin (1933) and has rarely been recorded since that date.

AGRIMONIA EUPATORIA L. (Agrimony)

Nepticula nitens Fologne (1862) (Lep. Nepticulidae)—a species new to Britain

Our standard text-books record three species of *Nepticula* feeding on *Eupatoria agrimonia*. These are *N. aeneofasciella* H.-S., a relatively common species which makes a fine gallery leading abruptly to a blotch, *Dechtiria agrimoniae* Frey, which makes a broad gallery gradually widening into a blotch in which the larva pupates, and *N. fragariella* Heyd., which makes a long, irregular gallery. Until recently I had attributed all gallery mines to this third species, but when I found some mines on agrimony, at Durfold, in Surrey, during a field meeting held there on the 9th of November 1970, I was at once struck by their dissimilarity from the other gallery mines on this foodplant which I had found in north Essex and preserved in my herbarium. Investigation showed that it was the Durfold mines which were *fragariella* Heyd. (or *aurella* Fab.—see below), while those I had previously encountered belonged to *Nepticula nitens* Fologne, a species hitherto not recorded from Britain in our own literature.

I therefore sent examples of each type of mine to Dr Joseph Klimesch in Austria for his opinion, and he was kind enough to confirm my determination. In his letter, however, he added the following proviso: "By the way, the imagines of *fragariella-dulcella-aurella-nitens* are all very similar to each other. I could not find any difference in the male copulatory apparatus.

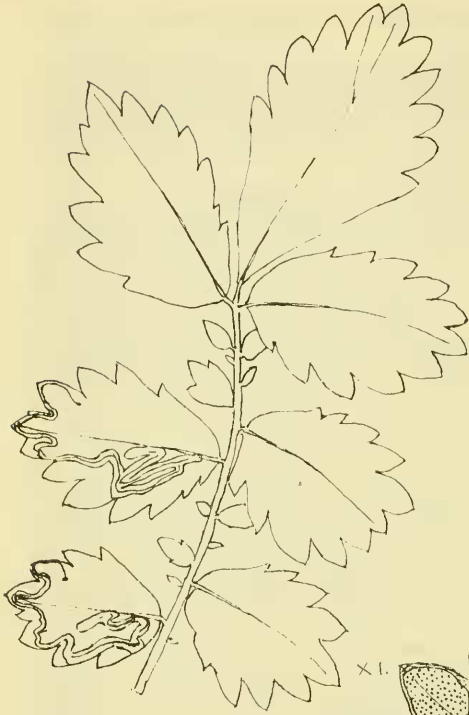
Perhaps there may be differences in the females but I had no chance to examine these."

The uncertainty regarding the status of these "species" is of long standing and is still far from being resolved. It therefore seems the best course to record *nitens* as a British species while at the same time making it clear that it may, in due course, be degraded to synonymy.

Fologne (1862) describes *nitens* as smaller than *aurella*. The basal portion of the wing is brilliant bronze with green reflections. The fascia beyond the middle of the forewing is brilliant yellowish silver, being less golden than that of *aurella*, and is wider on the dorsum than on the costa. A band preceding the fascia and the apical area beyond it are deep purple, being less bluish than these areas in *aurella*; furthermore, the transition from the coppery basal area to the purple outer area is abrupt; the underside of the wings is darker than in *aurella*.

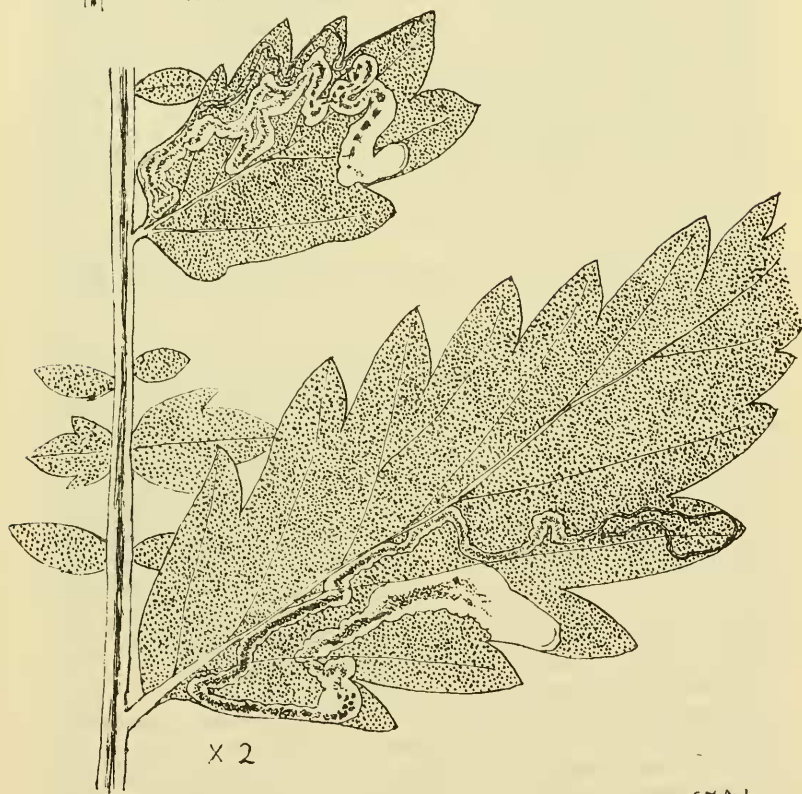
Tutt (1899, p. 166) mentions *nitens* as a species feeding on agrimony which has been recorded on the continent but not in Britain. It therefore came as a surprise to find that Hering (1957, p. 42) includes Great Britain in his account of the distribution of *nitens*. I at once suspected that Waters was his source of information and wondered whether I would find mines furnished by him in the Hering herbarium. In this I was disappointed, but I was interested to see that he had sent Hering mines of *aeneofasciella* from the Oxford district. Nevertheless, I think my hunch was correct, since in a paper from which Hering quotes in another context, Waters wrote (1924, p. 100), "Yellow larvae of the *aurella* type, inhabiting long slender galleries, are fairly common in this district [Oxford] on *Agrimonia*. The mines usually differ from those of *aurella* in having a much narrower and more compact excremental line, with wide empty margins. The imagines come close to *aurella*, but the ground-colour is greenish-golden (not coppery-golden or purplish-golden) and the colour of the head varies from orange to black. There is little doubt that this is a distinct species, and I refer it to *N. fragariella* Hein. I feel convinced, however, that *fragariella* sometimes feeds on bramble, and *aurella* probably on *agrimonia*. I have found a few mines with a slender excremental line on bramble, and have bred from them imagines with a greenish-golden ground-colour, and one with a black head. Conversely, I have bred specimens with a coppery-golden ground colour from *Agrimonia*. These cases, though apparently exceptional, indicate that the food-plant is not an infallible guide to the species".

Here we see Waters making the same mistake as I had done, and jumping to the conclusion that the gallery mines which he had found in agrimony were those of *fragariella*. The mines with the narrow excremental line, which he describes so clearly, are, in fact, those of *nitens*: all I would add to his



S.M.A.J.
12.XII.1970

Nepticula nitens Fologne



S.M.A.J.
29.xii.1970.

Nepticula fragariella Heydn

description is that there is a common tendency for the early mine of *nitens* to follow the margin of the leaf. The reader will notice that both Waters and Fologne describe the ground-colour of the moth in very similar terms.

I felt it essential that I should visit the Hope Department of Entomology at Oxford to see Waters's specimens, and at the same time I took the opportunity to study the mines in his herbarium. Both the moths and the mines are all placed over the label "*aurella*", though a question mark is added on one of the pages of mines. The food-plants are clearly indicated on the labels under the moths, but there is no way of linking particular specimens with particular mines. The mines are mainly of the *nitens* type, but among them there are some with a broader band of dispersed frass: I shall discuss the identity of these in due course. The imagines from *Agrimonia* were just as Waters described them, but a further striking character was their markedly smaller size than that of the specimens of *aurella* bred from *Rubus*—another point of agreement with Fologne's description. In case I was regarding them with a biased eye, I invited Mr E. Taylor of the Hope Department to pass judgment on the relative sizes, and he at once declared emphatically that the specimens from agrimony were smaller. I had no certain means of picking out the specimens bred from bramble which came from mines with a narrow excremental line, but what Waters had to say about the coloration of the imago enabled me to select several likely candidates.

Hering states that *nitens* is bivoltine, the larvae appearing in June and again in August to September. The scanty evidence at present available suggests that these dates apply equally to *nitens* in this country.

The other type of gallery mine is longer and broader and the excremental line is wider, with the frass tending to be dispersed in separated grains. Hering states that these are mines of *aurella*, and adds that the larvae may be found to be still feeding in the winter. Some of the mines I found at Durdold in the second week of November contained still active larvae which have since spun up. This winter feeding is, of course, characteristic of *aurella* on the evergreen bramble. Hering (1957, p. 445) recognises *fragariella* as a distinct species, but confines it for food-plant to *Fragaria vesca*. Waters, it appears, is in agreement with Hering in identifying these agrimony mines as *aurella*, and on the present evidence I think our best course is to fall in line with these authorities.

To sum up, there are two types of gallery mine on *Agrimonia* occurring at different times in the year and providing imagines which show constant marks of difference; the genitalia, however, appear to be identical. The moth from the smaller mine with the narrow line of excrement is *Nepticula nitens* Fologne, which is, in my opinion, a good species. The moth from the larger mine with dispersed frass is *Nepticula aurella* Fabricius. The record of *Nepticula fragariella* Heyden

feeding in agrimony is probably an error.

I am grateful to Mr S. N. A. Jacobs for the drawings of the mines of *nitens* and *aurella* (or *fragariella*), executed with his usual skill; and to Professor C. G. Varley for permission to study Water's specimens, mines and diaries preserved in the Hope Department of the University Museum at Oxford.

(To be continued)

Papilio cinyras ridens Fassl: a new status (Lepidoptera: Papilionidae)

By JOHN H. MASTERS

(P.O. Box 7511, Saint Paul, Minnesota, U.S.A.)

Papilio cinyras ab. *ridens* Fassl (1915) was described from a single male taken at Rio Songo, Bolivia, in March of 1913. Fassl called it a striking aberration and the only example in over 1000 *Papilio cinyras* that he had examined. While the original description is brief, the accompanying colour plate is excellent and *ridens* is readily recognised. Apparently the other specimens examined by Fassl were from Peru, for his form *ridens* is typical of specimens of *cinyras* from eastern Bolivia, which now appear to constitute a valid geographical subspecies. Although it has been ignored in the literature since the original description, *ridens* is the earliest available name for the Bolivian subspecies of *Papilio cinyras* and I am hereby elevating it to subspecific rank.

Papilio cinyras Menetries has long been considered conspecific with *Papilio thoas* Linnaeus, after they were united by Rothschild and Jordan (1906). Rothschild and Jordan were the first to use the male genitalia as a taxonomic criterion for the "*Papilio thoas*" group of swallowtails; a criterion which very conveniently separated *Papilio cresphontes* Cramer, *Papilio homothoas* Rothschild & Jordan, and *Papilio paeon* Boisduval from the others whom they united under *Papilio thoas*. Field data, which includes the sympatric occurrence of *Papilio thoas* and *Papilio cinyras* at several localities, leads me to believe that they are distinct species.

I have received a fairly large number of "*Papilio thoas*" from Bolivia, from Franz Steinbach of Cochabamba, over the past ten years. Steinbach had tentatively divided these into three ostensibly sympatric subspecies of *Papilio thoas*: *brasiliensis* Rothschild & Jordan, *thoantiades* Burmeister and *cinyras*. A careful examination of long series has shown me that there is no apparent intergradation or hybridization between the three forms, nor are they seasonal or brood forms. Their external appearance is very close, as is that of a half dozen closely related species, and I am unable to detect distinctions in the male genitalia, however I conclude that three species are involved. Steinbach's "*cinyras*" is a large-wide-banded form which agrees perfectly with Fassl's figure of